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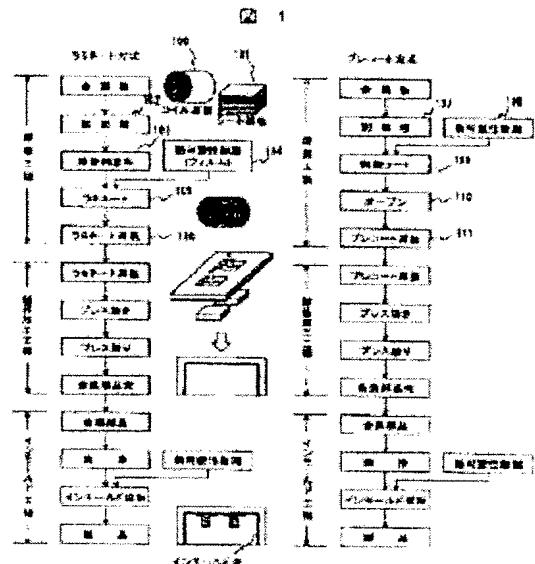
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(54) METHOD FOR MANUFACTURING ELECTRONIC EQUIPMENT HOUSING

(57)Abstract:

PROBLEM TO BE SOLVED: To produce an electronic equipment housing made of a metal plate and a thermoplastic resin by composite molding by a method for manufacturing with a high productivity.

SOLUTION: A laminating method has the steps of pretreating 102 such as degreasing, coating and conversion treating or the like a coil original plate 100 or a sheet original plate 101 in an original plate process, then coating the plate 100 or the plate 101 with an adhesive 103, laminating 105 a thermoplastic resin film 104 on its surface, thereby manufacturing a laminated original plate 106. Meanwhile, a precoating method has the steps of coating 109 the plate with a thermoplastic resin 108 in an original plate process, and baking the plate in an oven 110, thereby obtaining a precoated original plate 111. In a component processing step, the laminated original plate or the precoated original plate manufactured in the original plate process is metal press molded in a multi-cavity mold, thereby manufacturing a plurality of object metal components. Thus, an integrally efficient production of thermally welding of an in-mold resin to the coil original plate of multiple sizes or the sheet original plate, processing the pressed component from the original plate, and in-mold molding can be performed.



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CLAIMS

[Claim(s)]

[Claim 1]A lamination of a thermoplastic resin film, or a coil negative which carried out precoat of the thermoplastics, Or a manufacturing method of electronic equipment casing carrying out composite molding to one with thermoplastics which pierced from a metal plate of a sheet negative, equipped with metal parts which carried out press-forming forming in a metallic mold, and fabricated composition parts, such as a rib and a boss, by injection molding to this laminate layer side or a precoat stratification plane.

[Claim 2]A method according to claim 1 characterized by high design lamination processing or carrying out coating treatment as a metal plate in this laminate layer side or an opposite field of a precoat stratification plane.

[Claim 3]A method of using 0.3–1.0 mm of aluminum, an aluminum alloy, or a Magnesium alloy as a metal plate according to claim 1 or 2.

[Claim 4]A method according to claim 1 or 2, wherein metal parts use a board of aluminum, an aluminum alloy, or a Magnesium alloy by cold work, carrying out press-forming forming.

[Claim 5]A method according to claim 1 or 2 which provides a melting point difference in the melting point of thermoplastics which carries out injection molding that thermal melting arrival should be carried out to this laminate layer or a precoat stratification plane after processing the melting point and a metal plate of thermoplastics of a laminate layer processed to a metal plate, or a precoat layer, and is characterized by the former melting point being high not less than 10 **.

[Claim 6]After processing heat deflection temperature and a metal plate of thermoplastics of a laminate layer processed to a metal plate, or a precoat layer, A method according to claim 1 or 2 which provides a temperature gradient in heat deflection temperature of thermoplastics which carries out injection molding that thermal melting arrival should be carried out to this laminate layer or a precoat stratification plane, and is characterized by the former heat deflection temperature being high not less than 10 **.

[Claim 7]A metallic mold is equipped with metal parts produced by carrying out post processing of the metal plate which carried out precoat of a lamination or the thermoplastics for a thermoplastic resin film, Carry out injection molding of the thermoplastics to a laminate layer side or a precoat stratification plane, and in composition parts, such as a rib part to constitute or a boss section, to it as composition with the stage, Make root-parts rib width into T_0 and diameter of boss T_0' , and Said laminate layer side, Or a method according to claim 1 or 2 which sets width with the rib stage with a stage which carries out thermal melting arrival to a precoat stratification plane to T_1 , sets boss ***** in a relation of T_1' , and is characterized by being $T_1/T_0 \leq 3/2$, and $T_1'/T_0' \leq 3/2$.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]**[0001]**

[Field of the Invention] This invention relates to the manufacturing method of electronic equipment casings, such as a personal computer.

[0002]

[Description of the Prior Art] Conventionally, in the case of the portable electronic device represented with a note type personal computer, an electronic notebook, telephone, etc., lightweight nature, a thin type and high rigidity, electromagnetic wave shielding, heat dissipation nature, beauty, etc. are required. Although its attention was paid to the plastic as a material of a case and ABS plastics were used from a viewpoint of the weight saving of a product, thinning fell victim from insufficient strength, such as rigidity. In order to compensate rigidity insufficiency, a reinforced plastic case, such as a polymer alloy of ABS and PC and also glass, and carbon fiber, came [then,] to be put in practical use. However, also with these plastics, mobility falls easily and there is a limit in light-gage high rigidity. Since the plastic itself does not have the feature which shields electromagnetic waves, plating or coating treatment is performed for a conductive material to a case inner surface, and the method of giving electromagnetic shielding nature is used, but this processing is a major factor of the manufacture cost hike. With the improvement in the speed to highly-efficientizing of electronic equipment, high integration of a chip and high density assembly progress, the thermal density of an element simple substance becomes high, and heat dissipation nature has also been important SUBJECT. That is, at present, the plastic casing with which it is synthetically satisfied of the features searched for, such as a light weight, light-gage high rigidity, electromagnetic shielding, and a radiation characteristic, is not obtained. On the other hand, in order to satisfy such performances, the CHIKUSO mold method of magnesium, etc. are put in practical use as the dies casting of sheet metal or the aluminum alloy of an aluminum alloy or a Magnesium alloy, or a Magnesium alloy, and a still newer process. However, with sheet metal, there is a fault which cannot form a rib, a boss, a fitting part, etc. easily. The advantage which can fabricate a rib, a boss, etc. to one in dies casting or the CHIKUSO mold method is difficult for shaping of more complicated shape, such as undercut structure of a certain thing. Therefore, about these complicated structural sites, it will make by machining after shaping, productivity was inferior, and, also economically, it became expensive. As mentioned above, as stated, there are merits and demerits and it cannot be satisfied with resin or a metal simple substance of demand characteristics. The one composite molding of resin and metal was able to be considered as a means to solve these problems. This method is yne molding. Yne molding sets metal parts in a metallic mold, after that, carries out injection molding of the resin, and unifies. There are insert molding which embeds metal parts in resin, and outsert molding which fabricates a resin part on a metal substrate in yne molding. The joining method of the metal parts in yne molding and resin becomes grant of an anchor effect. a metal-parts end -- prescribed dimension ***** -- by things, a breakthrough is provided in the structure where a resin layer holds metal parts in its arms, and metal parts, surroundings ***** metal parts are carried out by ***** structure etc., and junction immobilization of resin and the metal is carried out for resin according to an anchor effect at a breakthrough. Since junction

power is based on an anchor effect to the last, structural limits of resin material and an anchor, such as the rigidity of resin, shape of an anchor, and arrangement, are accompanied by it. It is easy to produce problems, such as a crevice by the die shrinkage difference of metal and resin, and peeling. In the exterior parts of electronic equipment casing, the anchor section of resin is exposed to a surface, and smooth finishing is difficult and becomes fatal on finery finishing of appearance.

[0003]As an analogous art, it is indicated to JP,H7-124995,A. . [whether in this JP,H7-124995,A, heat-resistant elastomeric adhesives, such as a nitrile rubber system and a chloroprene rubber system, are applied to metal parts, and] Or the method of ejecting and carrying out composite molding of the resin to the part which applies hot melt adhesive, such as a polyurethane system, and constitutes a rib part and a boss section on the adhesives layer. The aforementioned method of using film glue as adhesives. The surface treatment of triazine-thiol is performed to metal parts, and the method of ejecting and carrying out composite molding of the resin which is rich in triazine-thiol and reactivity to the part which constitutes a rib part and a boss section on the surface treatment layer is proposed.

[0004]

[Problem(s) to be Solved by the Invention]The above-mentioned conventional technology has pretreatment for pasting up the whole target part piece with the thermoplastics which carries out injection molding, for example, the adhesive application to metal parts, the method of pasting up via film glue, a method of performing drugs processing of triazine-thiol, etc. These have low productivity, and when it is the latter, they have problems, like the choice of the construction material of the thermoplastics which carries out injection molding is narrow. In applying to the exterior parts of electronic equipment casing, the coating treatment to every parts and an armor face is needed, and a process is not only complicated, but causes [big] a cost hike.

[0005]The purpose of this invention is to produce the electronic equipment casing which comprises the composite molding of a metal plate and thermoplastics by a process with very high productivity.

[0006]

[Means for Solving the Problem]In a manufacturing method which carries out composite molding of metal and the resin for electronic equipment casing which has a rib part or a boss section at least to one in one feature of this invention, Metal parts of the target shape are made by press-forming processing from a coil on condition of mass production which carried out precoat processing of a lamination or the thermoplastics for a thermoplastic resin film beforehand and to take [many], or a sheet-shaped metal plate. Next, these metal parts are set to an injection molding die, and a manufacturing method of electronic equipment casing carrying out composite molding of said rib part or the boss section part to a lamination or a precoat stratification plane by ejection of thermoplastics in which thermal melting arrival is possible is provided.

[0007]an opposite side which allocates a rib part or a boss section part at least as other features of this invention, i.e., a metal plate applicable to the exterior, -- a coiled form -- or, By performing film laminate or coating treatment aiming at a design in a sheet shaped, a manufacturing method of electronic equipment casing, wherein an armor face carries out composite molding of metal parts by which design processing was carried out, and the resin to one is provided. In this case, as compared with a case where process metal parts and resin by the composite molding back, and an armor face is processed by paint etc. to one, outstanding improvement in productivity and reduction of a production cost are attained.

[0008]It excelled in lightweight nature to which metal changes from aluminum and an aluminum alloy, or a Magnesium alloy in one composite molding of metal parts and resin as other features, and a manufacturing method of electronic equipment casing excellent in productivity is provided. However, a Magnesium alloy uses possible alloy composition of cold work.

[0009]A laminate layer processed to a metal plate in one composite molding of metal parts and resin, Or in the melting point of thermoplastics which carries out injection molding that thermal melting arrival should be carried out to this laminate layer or a precoat stratification plane after processing the melting point or heat deflection temperature, and a metal plate of thermoplastics of a precoat layer, or a temperature gradient of heat deflection temperature, When the former

sets up not less than 10 ** highly, the heat flow rate appearance of this laminate layer or the precoat layer is hard to be carried out at the time of ejection of thermoplastics in which the latter carries out injection molding, and thermal melting arrival in an interface is stabilized. [0010]A metal plate which carried out precoat of a lamination or the thermoplastics for a thermoplastic resin film, Equip a metallic mold with metal parts produced by carrying out post processing, and in composition parts, such as a lamination, a rib part which carries out injection molding of the thermoplastics to a precoat stratification plane, and constitutes it in it, or a boss section, as composition with the stage, Make root-parts rib width into T_0 and diameter of boss T_0' , and Said laminate layer side, Width with the rib stage with a stage which carries out thermal melting arrival to a precoat stratification plane Or T_1 , Bonding strength of composition parts, such as a rib, a boss, etc. to these metal parts, can be stably raised by setting boss ***** to $T_1/T_0 \leq 3/2$, and $T_1'/T_0' \leq 3/2$ in a relation of T_1' .

[0011]

[Embodiment of the Invention]Drawing 1 and drawing 2 explain one working example of this invention below using a flow chart.

[0012]Drawing 1 shows how to laminate the film which uses as the main ingredients said thermoplastics and the thermoplastics in which thermal melting arrival is possible in the metal surface which constitutes composition parts, such as a rib and a boss, by yne molding of thermoplastics, and the method of carrying out precoat to the metal plate of a coil negative or a sheet negative.

[0013]first, the process of the difference between film laminate and precoating being in a negative process, and carrying out the yne mold of the composition parts, such as a part work process and a rib, and a boss, -- both sides -- it is the same.

[0014]In a negative process, the laminating method applies the adhesives 103, after performing pretreatment 102 of degreasing, tunic chemical conversion, etc. for the coil negative 100 or the sheet negative 101. The thermoplastic resin film 104 is made the field lamination 105, and the lamination negative 106 is manufactured to it. The construction material of a thermoplastic resin film selects the thermoplastics which carries out injection molding of the composition parts, such as a rib and a boss, by the yne mold method, and resin in which thermal melting arrival is possible. For example, according to the purpose, it can choose from a polyolefin system, a polystyrene system, a polyester system, a polyamide system, acrylic, a polyvinyl system, its polymer alloy, etc. On the other hand, in a negative process, precoating carries out the thermoplastics 108 coating 109, after performing pretreatment 107 of degreasing, tunic chemical conversion, etc. for the coil negative 100 or the sheet negative 101. In the case of a liquid composition, in the case of a roll coat and a powdered constituent, thermoplastics is calcinated after coating and in the oven 110 by electrostatic powder coating etc., and the precoat negative 111 is obtained. In the case of the use which thinks lightweight nature as important, to the metal negative used for the laminating method and precoating, low specific gravity metals, such as aluminum, an aluminum alloy, and a Magnesium alloy, are preferred. Of course, it is also possible to use sheet metal, such as an iron system surface treated steel sheet and a stainless steel plate.

[0015]Next, in a part work process, metal mold pressing taken from the lamination negative or precoat negative manufactured at the negative process is performed, and the target metal parts are manufactured. [two or more] Thus, electronic equipment casing for compound integral moulding of metal parts and the resin to have been carried out can be obtained by setting the obtained metal parts to an injection molding die in the following yne molding step, and carrying out injection molding of the composition part which comprises thermoplastics, such as a rib and a boss.

[0016]The above is a process which makes the armor face of electronic equipment casing a smooth metal surface, and carries out the yne mold of the composition parts, such as a rib and a boss, to an inner surface with thermoplastics. The armor face of a case will be finished at a separate process, when carrying out design finishing of paint etc. That is, although it is possible

to attain the purpose of design finishing of an armor face by painting the whole item in the state of metal-parts ***** of flow chart drawing 1 or yne molding step Kan, the cost hike of the part is not avoided.

[0017]Then, as shown in flow chart drawing 2, design finishing of an armor face is not processed the whole item, The process of processing film laminate or precoat paint aiming at the design which can be equal to press forming at the coil or sheet negative process of multi-size in the surface of metal used as an armor face (the yne mold side lamination processing 200 and the film 201 for designs) [and] By adding the design surface lamination processing 202, it is at the yne molding step completion time, and it becomes possible to be able to provide an armor face with the electronic equipment casing by which design finish was carried out beforehand. Various expressions are possible for a feeling of a design of an armor face, and if it is film laminate, broad designs, such as a color, a pattern, a crimp, a mat, and a soft touch, can be realized by selection of a film. In precoat paint on the other hand, a broad expression is possible by selection of the coating method of the yne mold side resin coat 203 and the precoat paints 204 for designs (a color, gloss, a mat, a soft touch, etc.), and addition of the design surface resin coat 205. In the case of the former, films, such as polyethylene terephthalate, polyolefine, AKURI nitril styrene butadiene rubber, urethane, and vinyl chloride, can be used in construction material. In the case of the latter, the polyester system and the urethane system paint are suitable.

[0018]Drawing 3 is a case UEKESU perspective view of the pen input-type personal computer which is the 1st operation of this invention, and the section shows it in part so that composition may be known. Drawing 4 is an expansion perspective view of the partial section of drawing 3. In drawing 3 – drawing 4, 1 is UEKESU and consists of the next composition. The polycarbonate laminate film of thickness 0.1 which pasted up 2 on the aluminum alloy plate of thickness 0.6, and 3 pasted up on the aluminum alloy plate 2, The polyester system precoat by which 4 was painted by the aluminum alloy plate 1, the ABS frame to which integral moulding of 5 was carried out by the yne mold, and 6 are the same, a boss and 7 are the same, a rib and 8 are the same, and it is a hinge.

[0019]The multi-size sheet negative (t0.6 xW600xL1,600) of the aluminum alloy which made many picking of UEKESU 1 possible was used for the UEKESU press-working-of-sheet-metal negative in the previous process which carries out a yne mold. First, after degreasing and washing as processing of the polyester system precoat 4 used as a design surface, chromate treatment aiming at rust prevention and coat adhesion was performed, and coating treatment was performed in order of primer paint of an epoxy conversion polyester system, and polyester system topcoat. Next, the roll coat of the reactant urethane application was carried out to the yne mold side which faces to said design surface, and the polycarbonate film of t0.6 was laminated.

[0020]Thus, from the obtained lamination negative, press working of sheet metal of UEKESU of W150xL220xH7.0 was carried out so that the polyester system precoat 4 might serve as a design surface as a part work process. The lamination negative extracted press working of sheet metal, and it obtained the pressed part through each process of a press, the drawing press of H7.0, and a trimming press. Next, it progressed to the yne molding step, said pressed part was set to the injection molding die, injection molding of the ABS plastics (techno ABS330: Techno Polymer) was carried out, and UEKESU 1 which fabricated the ABS frame 5, the ABS boss 6, the ABS rib 7, and the ABS hinge 8 to one was manufactured. Hot welding of the interface of the ABS frame 5 in contact with the polycarbonate laminate film 4 of a pressed part, the ABS boss 6, the ABS rib 7, and the ABS hinge 8 is carried out by the ABS-plastics temperature of 200–230 ** at the time of injection molding and the injection pressure 20 – 30MPa.

[0021]Thus, as for those with 2 or more MPa, and an armor face, polyester coating finishing of the bonding strength of composition parts, such as a frame, a boss, a rib, etc. which carried out injection molding of obtained UEKESU 1 by yne molding, is carried out.

[0022]In the difference with working example 1, the polyurethane film of the soft touch feeling was laminated instead of the polyester system precoat 4. Except it, the same processing as working example 1 was performed, and UEKESU 1 was manufactured. Since the polyurethane film of the soft touch feeling laminated the armor face, its touch was good, and UEKESU 1 excellent

in the touch feeling was obtained.

[0023]In drawing 3 – drawing 4, 1 is UEKESU and had the next composition. The ABS frame to which the ABS lamination of thickness 0.5 which pasted up 2 on the stainless steel plate of thickness 0.3, and pasted up 3 on the stainless steel plate 2, and 4 did not constitute, but integral moulding of 5 was carried out by the yne mold, and 6 are the same, a boss and 7 are the same, a rib and 8 are the same, and it is a hinge.

[0024]The stainless steel plate (t0.3xW250xL1,000) which made many picking of UEKESU 1 possible and which carried out one side hair line processing was used for the press-working-of-sheet-metal negative of UEKESU in the previous process which carries out a yne mold here. Next, adhesives were used for the opposite side of the hairline processing design surface after degreasing and washing, and the ABS sheet of t0.5 was laminated. Not only hair line processing but the various expressions of the armor face of the stainless steel plate 2 of crepe, a crimp, gloss, etc. are attained.

[0025]Thus, press working of sheet metal of UEKESU of W150xL220xH7.0 was performed so that a hair line processed surface might turn into an armor face from the obtained lamination negative as a part work process. After preheating a lamination negative at 150 **, press working of sheet metal was extracted and extracted, was processed in order of trimming, and obtained the pressed part. Next, the yne mold of the ABS plastics (techno ABS330: Techno Polymer) was carried out like working example 1 and 2, it has an armor face which is full of metaled textures, and UEKESU 1 excellent in productivity was obtained.

[0026]Drawing 5 shows the sectional view of a boss section, and drawing 6 shows the section of a rib part. In [as the yne mold shape of the boss 6 in working example 1-3 and the rib 7 is shown in drawing 5 and drawing 6 in UEKESU of drawing 3] the relation of $T_0 < T_1$ and $T_0' < T_1'$, When the hot welding relation between 6 to 3 or 7 in $T_1/T_0 \leq 3/2$, and $T_1'/T_0' \leq 3/2$ was, the adhesive strength of the boss 6 and the rib 7 improved, and the stabilized result was obtained. Adhesive strength improves in proportion [almost] to T_1/T_0 and T_1'/T_0' magnification.

[0027]

[Effect of the Invention]According to this invention, it becomes possible to produce the electronic equipment casing which comprises the composite molding of a metal plate and thermoplastics by a process with very high productivity. In particular, hot welding processing with yne mold resin to the coil or sheet negative of multi-size and also design processing of the metal plate used as a design surface are processed in the state of a negative, and are placed, and it has the big feature that processing of a pressing and efficiency production production and a yne mold cohered can be performed from this negative. The adhesion with yne mold resin can consider various combination by selection of lamination resin to a metal plate, or precoat resin, and the various deployment of it is attained. In order not to depend on an anchor effect, an armor face serves as a smooth result.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is a flow chart figure showing the concept of electronic equipment casing manufacture.

[Drawing 2] It is a flow chart figure showing the concept of the electronic equipment casing manufacture including design finishing.

[Drawing 3] It is a perspective view of UEKESU of a pen input-type personal computer.

[Drawing 4] It is an expansion perspective view showing the partial section of drawing 3.

[Drawing 5] It is a fragmentary sectional view showing the example of the boss section in drawing 3.

[Drawing 6] It is a fragmentary sectional view showing the example of the rib part in drawing 3.

[Description of Notations]

1 [-- Polyester system precoat, 5 / -- The ABS frame, 6 / -- An ABS boss, 7 / -- An ABS rib, 8 / -- An ABS hinge, T₀-T₁ / -- A boss and section layer of a rib.] -- UEKESU, 2 -- An aluminum alloy plate, 3 -- A polycarbonate laminate film, 4

[Translation done.]

* NOTICES *

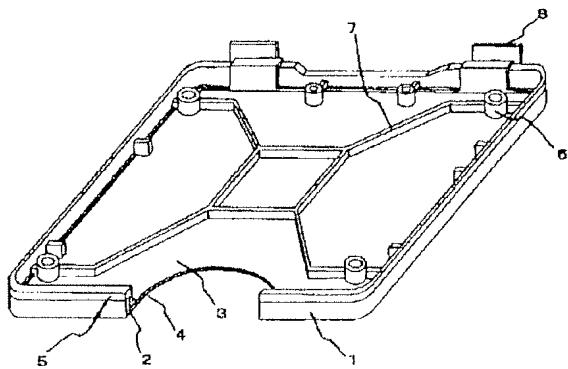
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DRAWINGS

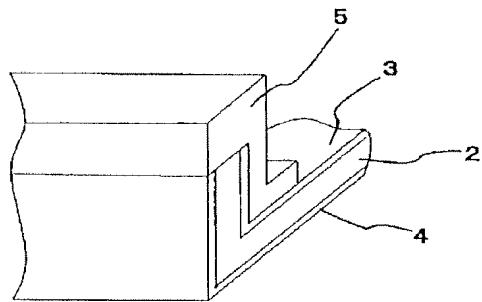
[Drawing 3]

図 3



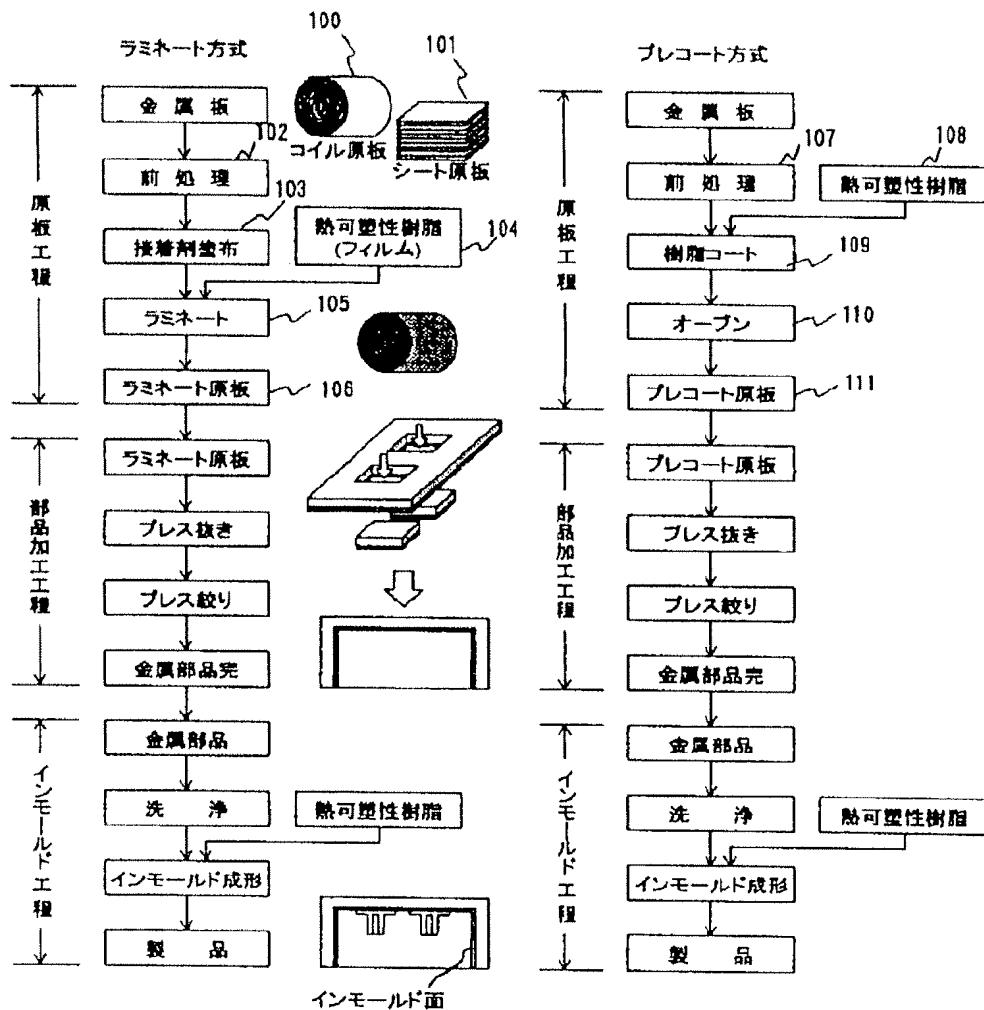
[Drawing 4]

図 4



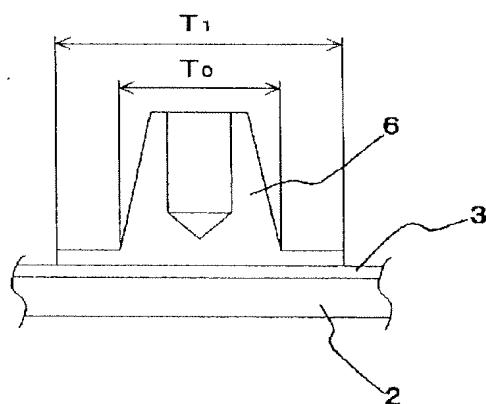
[Drawing 1]

図 1



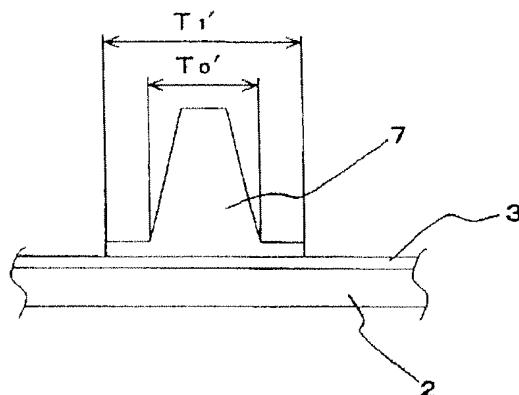
[Drawing 5]

図 5



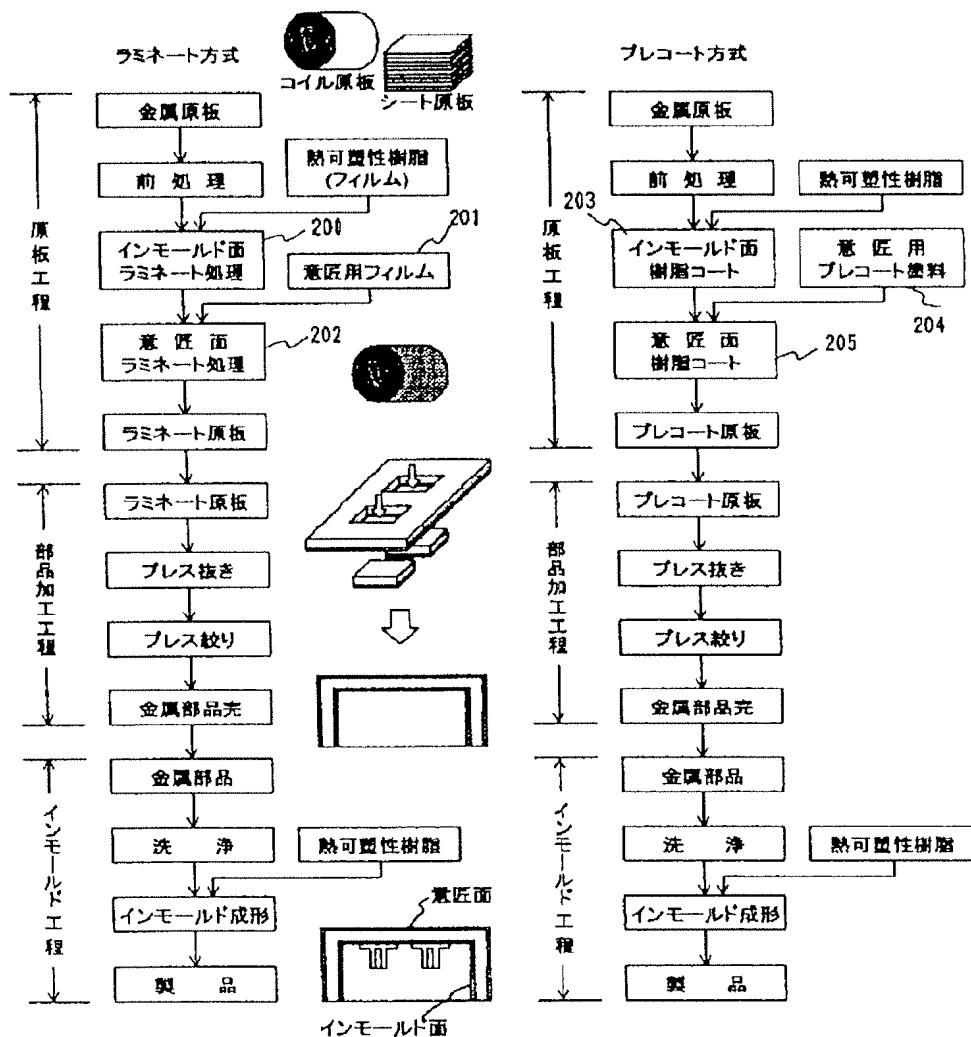
[Drawing 6]

図 6



[Drawing 2]

図 2



[Translation done.]